

BIOGEOGRAPHY AND TAXONOMY OF THE REEF CAVE DWELLING CORALLINE DEMOSPONGE *ASTROSCLERA WILLEYANA* THROUGHOUT THE INDO-PACIFIC. *Memoirs of the Queensland Museum* 44: 650. 1999:-

Astrosclera willeyana Lister, 1900, is a pyriform-half spherical, predominantly bright orange coralline demosponge. The habitat of *Astrosclera* is generally restricted to cryptic and light reduced environments of the Indo-Pacific, found mainly in reef caves, but sometimes also in the dim-light areas of cave entrances and overhangs. Its spicule skeleton consists of megascleres only, whereas microscleres are absent. The basic spicule type is a sub-verticillate to verticillate acanthostyles, of the *Agelas* type, with a mean length of 80µm. The spicule morphology and size is highly variable, depending on the geographic origins of specimens. Variability in spicule morphology of *Astrosclera* from different geographic localities was previously reported by several authors (Vacelet, 1967, 1977, 1981; Ayling, 1982; Wörheide et al., 1997), and Vacelet (1981) discussed the idea that there might be more than one species of *Astrosclera*. Empirical testing of the question - whether variation in spicule morphology represents geographic variation or separate species - was undertaken in this study, examining the spicule morphology of specimens from 26 geographically distinct populations. Corroborative evidence from a restriction fragment length analysis of the ribosomal DNA was also undertaken for twenty specimens from five geographically distinct populations of *Astrosclera*.

Analysis of spicule morphology showed that variation was not random but specifically linked to geographical origin of the specimen. Six groups were recognized with similar spicule morphology (group with similar spicule morphology: GSSM's), based on spicule length, spination, proximal thickening, and abundance. These GSSM's comprise populations from adjacent localities. These spicule data, therefore, support the concept that there may be more than one species of *Astrosclera*, whereas analysis of ribosomal DNA did not lend support to this hypothesis. The RFLP-method of rDNA-analysis was sensitive enough to detect species-level differences in sponges, as shown by comparative studies on other demospoges, but until further divergent characters are found, the different GSSM's are still regarded as one species. The GSSM's seem to represent geographic subspecies, whose genetic differences, expressed by different (non-random) spicule morphology, were not detected by rDNA-analysis. It is supposed that *Astrosclera* is

currently in the process of species separation. Each GSSM (or subspecies) is likely to have its own history with respect to radiation, isolation and evolution, and a model of the biogeographic and phylogenetic relationships of the GSSM's are presented. See Wörheide (1998) for details. □ *Porifera, biogeography, taxonomy, Astrosclera, ribosomal DNA, spicule morphology, phylogeny.*

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